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NEW GENERA OF UNSTALKED CRINOIDS.

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Some time ago I published a revision of the genus "*Antedon*" as understood by Dr. P. H. Carpenter and most modern workers upon the *Crinoidea*, in which I divided the group into eighteen genera in an attempt to better bring out the relationship of the various specific types. The material at hand at the time was not very extensive, and I was forced to leave certain genera, most especially *Antedon* (as restricted), in a somewhat unsatisfactory condition; although I realized that I was "lumping" certain well-defined generic types under a single generic name, I did not feel justified in making any further subdivisions. Further study and more abundant material have shed much light upon many obscure points, and I am now able to point out certain additional, apparently well-marked and homogeneous, specific groups.

My previous paper contains one or two errors, which I take this opportunity of correcting; the pinnules of *Calometra* are said to be cylindrical, whereas in reality they are sharply triangular; this error arose from having studied only wet material, whereas a true idea of the characters of the Comatulida can only be ascertained from dried specimens; I followed Carpenter in placing *Antedon dübeni* of Böhlische near *Antedon bifida*, in my restricted genus *Antedon*; it is, however, merely the young of *Tropiometra carinata*; *Antedon tenuicirra* of Carpenter should have been placed in *Thysanometra*; it is possibly the young of *T. tenelloides*, but further material is necessary before they can be united with certainty; the species *compressa* and *orion*, placed

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in *Charitometra*, should have been referred to *Thalassometra*; the *Antedon flava* of K  hler and the *Antedon porrecta* of Carpenter (which were omitted) also belong to *Thalassometra*. I had not been able to consult Professor Bell's paper on South African crinoids, although I had examined specimens of his *capensis*; of the two other species described, *scateri* belongs to the genus *Charitometra* (near *C. inaequalis*) and *magnicirra* to *Thalassometra*.

#### FAMILY HIMEROMETRIDÆ.

##### **Oligometra** gen. nov.

*Genotype*.—*Antedon scrippinna* P. H. Carpenter, 1881.

Centro-dorsal flat, discoidal, the cirri marginal, in one or two more or less irregular and crowded rows. Cirri short and stout, composed of few, twenty or less (rarely one or two more), squarish or short joints; the opposing spine central in position and short; the distal joints may bear centrally situated spines, paired spines, or tubercles. Radials more or less concealed; costals rounded, broad, and may or may not be in apposition laterally. Ten arms of rather short, wedge-shaped joints, becoming oblong distally. Proximal pinnules rather stouter and stiffer than the others, but not especially marked; one or more elongate, but little, if any, longer than the distal pinnules; the proximal joints of the lower pinnules often bear strong, thin, rounded keels, or elongate processes, and the distal joints may have overlapping and spiny distal ends.

*Color*.—Purple or yellow, or yellow or white, more or less heavily banded or mottled with purple.

*Geographic distribution*.—Tropical; Caribbean Sea at Panama; east Africa eastward to northern Australia and southern Japan.

*Depth*.—Littoral, but occurring down to 60 fathoms.

The short, stout cirri, with short or squarish subequal joints bearing dorsal spines or tubercles, and the opposing spine in the center, and the round and stiffened, but otherwise not specially differentiated, lower pinnules distinguish this genus at a glance. The included species are,

*O. adonax* (Lamarck).

*O. japonica* (Hartlaub).

*O. bidens* (Bell).

*O. pinniformis* (P. H. Carpenter).

*O. caribbea* A. H. Clark.

*O. scrippinna* (P. H. Carpenter).

*O. carpenteri* (Bell).

#### FAMILY ANTEDONIDÆ.

##### **Erythrometra** gen. nov.

*Genotype*.—*Antedon ruber* A. H. Clark, 1907.

Radial faces low, about as broad as high; the dorsal surface of the radials is approximately vertical to the dorso-ventral axis of the animal; muscular fosse small, their area scarcely greater than that of the inter-articular ligament fosse, the notch separating them broad, but comparatively shallow, not reaching half way to the axial canal. Centro-dorsal

hemispherical, the cirrus sockets irregular in distribution, but approaching fifteen columns of two each. Cirri with about thirty joints, a few of the proximal longer than broad, the remainder squarish, the distal not bearing dorsal spines; the opposing spine is prominent, terminally situated, reaching in length rather more than half the diameter of the penultimate joint; the spine is almost an isosceles triangle, arising from the entire dorsal surface of the joint; terminal claw rather stout, well curved, rather longer than the penultimate joint. Interradial areas with two or three columns of small, rounded interrarial plates, not in contact; interbrachial plates may or may not be present between the two arms of each pair; disk naked. Costals rather narrow, well separated, the first oblong, about twice as broad as long, the second pentagonal, both occasionally furnished with small dentate processes. Ten arms of comparatively elongate joints. First pinnule longer and stiffer than those following, but shorter than the distal; the pinnule of the fourth (epizygal) brachial is absent.

*Color*.—Salmon red, the pinnules the same, or yellow; cirri white.

*Geographic distribution*.—Only known from southern Japan, from the Korean Straits to Sagami Bay.

*Depth*.—50 to 100 fathoms.

The presence of interrarial and interbrachial plates on an otherwise naked disk, distinguish this genus at once from all other genera of Antedonidae; the absence of the first inner pinnule should be noticed. The only species at present known is,

*Erythrometra ruber* (A. H. Clark).

### **Thaumatometra** gen. nov.

*Genotype*.—*Antedon ciliata* A. H. Clark, 1907 (= *Antedon tenuis* A. H. Clark, 1907).

Radial facets about as broad as high, the muscular fossae large and well rounded, distally separated by a narrow, sharp notch, which extends for less than one-quarter of the length of their apposed sides; interarticular fossae remarkably small, the ridge separating them from the muscular fossae horizontal in its outer half, gently oblique in its inner. Centro-dorsal conical or sub-conical, the sides convex, somewhat thickly, and almost entirely, covered with crowded cirrus sockets. Cirri slender, numerous, with fifteen to thirty subequal joints, all of which are usually longer than broad; there may be a slight ventral overlap, but spines are not developed; the opposing spine is prominent, terminally situated, and directly obliquely forward. Radials almost, or entirely, hidden by the centro-dorsal; costals moderately short, the costal-axillary pentagonal, more or less produced posteriorly. Ten arms, the lowest brachials oblong, broader than long, then triangular about as long as, or rather longer than, broad, distally becoming much elongate, quadrate, or almost oblong, with swollen articulations. The calyx and brachials are often more or less spinous. The first pinnule is slender, composed of elongated joints, and may be somewhat, or not at all, longer than the second; the second

pinnule and those following are stouter than the first, and bear long fusiform genital glands.

*Color*.—Yellow or brownish yellow.

*Geographic distribution*.—Antarctic Seas, and Pacific Ocean north to Panama, northern Japan, the Sea of Japan, and the Gulf of Tartary.

*Depth*.—140 to 1,600 fathoms.

The elongate joints of the first pinnule, and the occurrence of a genital gland on the second and of an oblique opposing spine on the penultimate joint of the cirri distinguish this genus at once from all others. The species are almost all small, reaching the maximum size, in common with *Psathyrometra* and *Heliometra*, in the northern part of the Sea of Japan. The species referable to this genus are,

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| <i>T. abyssorum</i> (P. H. Carpenter). | <i>T. isis</i> (A. H. Clark).           |
| <i>T. alternata</i> (P. H. Carpenter). | <i>T. levis</i> (P. H. Carpenter).      |
| <i>T. comaster</i> (A. H. Clark).      | <i>T. longipinna</i> (P. H. Carpenter). |
| <i>T. exigua</i> (P. H. Carpenter).    | <i>T. parva</i> A. H. Clark.            |
| <i>T. hirsuta</i> (P. H. Carpenter).   | <i>T. parvula</i> (Hartlaub).           |
| <i>T. remota</i> (P. H. Carpenter).    |   |

#### **Coccometra** gen. nov.

*Genotype*.—*Comatula hagenii* Pourtalès, 1869.

Radial facets with long, narrow, triangular muscular fossæ, separated from the interarticular ligament fossæ by a strongly diagonal ridge; the radial face is considerably longer than broad, and almost wedge-shaped in outline. Centro-dorsal low-hemispherical, a rather large area at the pole bare and papillose. Thirty to fifty cirri with fifteen to twenty joints, proximally two or three times as long as broad, gradually becoming shorter distally, the terminal few not being greatly longer than broad; no dorsal spines; opposing spine obsolete. Radials not projecting beyond the centro-dorsal; first costals very short, almost hidden in the median line by a posterior extension of the costal axillaries; there is a strong constriction at the intercostal articulation; costal axillaries longer than wide, the anterior angle produced, and all the sides incurved. Ten arms of moderately elongate joints. Lower pinnules long, approximately equal in length, the first composed of very numerous short joints, very delicate and flexible, the second and following with about half as many joints, the proximal three short, the remainder becoming rapidly elongated; the second and following pinnules bear large genital glands. After the second and third the pinnules gradually decrease in length, then become more slender and increase again, but do not reach the length of the first four.

*Color*.—Pale greenish, turning white in alcohol; or yellow, with a median stripe of black, or with large round spots of black at the syzygia.

*Geographic distribution*.—Caribbean Sea, north to Florida.

*Depth*.—82 to 242 fathoms (Carpenter).

From the genus *Thysanometra*, which also has the first pinnule composed of numerous short joints, and the second and following of elongated joints, *Coccometra* may be most readily differentiated by the character of

the radial faces. In *Thysanometra* these are approximately oblong, broader than long, the muscular fossæ large, transversely rounded-oblong, separated from the interarticular ligament fossæ by horizontal ridges, the exterior ends of which are more or less curved downward. In *Coccometra*, as described, these are wedge-shaped, elongate, the muscular fossæ elongate triangular, separated from the interarticular ligament fossæ by strongly diagonal and straight ridges. Externally, *Coccometra* may be distinguished by its longer arm joints, longer pinnule joints, and short distal pinnules which are not so long as the proximal, while in *Thysanometra* they are considerably longer. This is the only comatulid genus in which the coloration appears to have a systematic value. It includes three species, one which was described by Pourtalès, another mentioned by Dr. Hubert Lyman Clark, and a third as yet undescribed. They are, *C. hagenii* (Portalès).

*C. nigrolineata* [= *Antedon hagenii* H. L. Clark (not *Comatula hagenii* Portalès), 1901].

#### **Leptometra** gen. nov.

*Genotype*.—*Alecto phalangium* J. Müller, 1841.

Radial faces wedge-shaped, very long, nearly, or quite, twice as long as broad, the muscular fossæ much elongated, and sub-triangular, separated by a diagonal ridge from the fossæ lodging the interarticular ligaments, and in close opposition interiorly. Centro-dorsal hemispherical, conical, or somewhat columnar, bearing from twenty to thirty cirrus sockets which may, or may not, be regularly arranged, but are always separated more or less from each other. Cirri very long and slender, of more than forty cylindrical joints, slightly more elongate proximally than distally, squarish, or longer than broad; no dorsal spines; usually no opposing spine. Radials more or less hidden; first costal short, second usually pentagonal, rather large, deeply incising the first; the costals are strongly convex dorsally, and may or may not be in lateral apposition and laterally flattened. Ten long and slender arms of obliquely quadrate or triangular joints, as long as or longer than wide. First two pinnules elongate, slender and flagellate, the first six or eight joints short, the remainder elongate; following pinnules shorter, but the length of the basal joints gradually increases, except the two first, which become somewhat flattened; ovaries long and fusiform.

*Color*.—Green.

*Geographic distribution*.—Mediterranean Sea, west of Italy and Tunis; eastern Atlantic, from the Madeira Islands northward along the coasts of Europe, and west coast of the British Isles to the Hebrides.\*

*Depth*.—45 to 189 fathoms.

The great length of the muscular fossæ in this genus which are not interiorly separated by a notch is sufficient to distinguish it at once. Externally the elongate and slender cirri, which are smooth with very numerous

\* Reported also from Hope, or Seahorse, Island, just southeast of Spitzbergen; but Grieg has already called attention to the fact that this is probably a case of misidentification.

joints, and the equality of the two proximal pinnules readily differentiate it. It appears to be possible to distinguish two species, which are,

*L. cellica* (Barrett and McAndrew). *L. phalangium* (J. Müller).

**Hathrometra** gen. nov.

*Genotype*.—*Alectro dentata* Say, 1825.

Radial faces wedge-shaped, less than once and one-half as long as broad; muscular fossae triangular, less than twice as long as broad, not separated by a notch; the ridge between the muscular and interarticular ligament fossae is strongly oblique. Centro-dorsal conical, the sides somewhat convex, thickly covered with small and numerous cirrus sockets, which are closely crowded together, and arranged in more or less definite vertical rows. Cirri slender, with fifteen to forty-five joints, dimorphic, the apical cirri having fewer joints than the peripheral, and being considerably smaller; the proximal cirrus joints are much longer than the distal, and more or less "dice-box shaped"; the distal are squarish, or rather longer than broad, and the dorsal ends may overlap so as to produce spines; an opposing spine is always present, terminally situated. Radials almost, or quite, concealed; costal axillaries rhombic, almost concealing the first costals, which are short, in the median line; the costals are rounded dorsally, and in lateral opposition, though not laterally flattened. Ten arms, with triangular joints proximally, becoming more quadrate distally, always (except in the first few discoidal joints) as long as, or longer than, wide. First pinnule long and slender, twice or three times as long as the second; the following pinnules gradually increase in length; the genital glands are long and fusiform.

*Color*.—Dark green, or grayish green, sometimes dotted with white.

*Geographic distribution*.—Coasts of New Jersey and Portugal northward to the Arctic Ocean, and from the seas west of Greenland eastward to the Barents and Kara Seas.

*Depth*.—25 or less to more than 600 fathoms.

The characteristic conical centro-dorsal with its numerous crowded cirrus sockets, the great length of the first pinnule and the absence of a notch between the distal ends of the muscular fossae, these being much broader than in *Leptometra*, at once distinguish this genus. *Hathrometra* contains the following species:

*H. dentata* (Say).

*H. sarsii* (Düben and Koren).

*H. prolifica* (Sladen).

*H. tenella* (Retzius).

**Iridometra** gen. nov.

*Genotype*.—*Antedon adrestine* A. H. Clark, 1907.

Cirri few and short, with ten to sixteen joints, the proximal elongate, the distal shorter, on a discoidal or low-hemispherical centro-dorsal. Ten arms, the joints triangular, about as long as wide, becoming elongate distally. First pinnule short, never exceeding, and usually shorter than, the second, which does not bear a genital gland.

*Color*.—Varied and bright, and usually mottled or banded; brick red, white with purple bands, yellow-brown banded with darker, purple and white, or pinkish.



*Geographic distribution*.—Tonga Islands and northern Australia to Japan and the Hawaiian Islands.

*Depth*.—Mainly littoral, but extending downward to 150 fathoms.

The short and weak cirri with comparatively few joints, and the small first pinnule are sufficient to differentiate this genus at once. The included species are,

*I. adrestine* (A. H. Clark).

*I. minuta* (A. H. Clark).

*I. briseis* (A. H. Clark).

*I. nana* (Hartlaub).

*I. crispa* A. H. Clark.

*I. parvicirra* (P. H. Carpenter).

*I. psyche* (A. H. Clark).

### **Compsometra** gen. nov.

*Genotype*.—*Antedon lorenii* Bell, 1882 (= *Antedon pumila* Bell, 1884).

Similar to *Iridometra*, but the first pinnule is much longer than, usually about twice as long as, the second and following, and the joints of the proximal pinnules all overlap strongly.

*Color* (in spirits).—Olive gray or brownish, sometimes banded narrowly with darker.

*Geographic distribution*.—Port Jackson, New South Wales, northward to Tokyo Bay, Japan.

*Depth*.—Littoral, and down to 12 fathoms.

The extraordinary projection of the distal edges of the pinnule joints and the small cirri with comparatively few joints, which are distally much compressed and comparatively broad, distinguish this species at once. The two species at present known are,

*C. lorenii* (Bell).

*C. serrata* (A. H. Clark).

### **Trichometra** gen. nov.

*Genotype*.—*Antedon aspera* A. H. Clark, 1908.

Radial faces low, wedge-shaped, or almost triangular, the muscular fossae practically equilateral right-angle triangles, the distal apices separated by a small, narrow, and acute notch; ridges separating the muscular and interarticular ligament fossae horizontal. Centro-dorsal subconical, with somewhat strongly convex sides, thickly covered with small cirrus sockets, somewhat crowded, roughly arranged in two or three columns in each radial area. Forty to sixty cirri with twenty-five to thirty-five joints, elongate in the proximal half of the cirrus, squarish in the distal, the joints in the latter having a sharply carinate dorsal surface which projects more or less distally, giving a slightly spinous appearance; the opposing spine is prominent, terminally situated, arising from the entire dorsal surface of the joint, but does not reach the diameter of the joint in length; the terminal claw is rather longer than the penultimate joint, moderately stout, but comparatively slightly curved. "Small mature" cirri occur about the dorsal pole, which are sometimes less than half the length of the other cirri, consisting of ten or twelve very slender and much elongated joints, with greatly expanded articulations. Distal edges of radials even with the edge of the centro-dorsal, not extending up into the angles of the centro-dorsal; first costals very short, sometimes

six or eight times as broad as long; costal axillaries rhombic, as broad as or broader than long; the costals are in close apposition, and may be laterally flattened. Ten arms, the joints (except the proximal, which are transversely oblong or squarish), triangular or obliquely quadrate, about as long as wide, becoming more elongate distally. The first pinnule is exceedingly slender, half again as long to three times as long as the stouter second pinnule, composed of much elongated joints, especially distally where they are slender and threadlike, with the distal ends much expanded.

*Color*.—Yellow.

*Geographic distribution*.—Bahama Islands to Savannah, Georgia; Hawaiian Islands, about Molokai and the southern part of Oahu, and off Mani.

*Depth*.—270 to 440 fathoms.

The peculiar, long and slender first pinnule and the short costals, together with the numerous cirrus joints which are short distally, the short opposing and long terminal spine, the latter but little curved, at once distinguish this genus. The only known species are,

*T. aspera* (A. H. Clark).

*T. vexator* (A. H. Clark).

### **Bathymetra** gen. nov. \*

*Genotype*.—*Antedon abyssicola* P. H. Carpenter, 1888.

Centro-dorsal small, hemispherical, the cirrus sockets rather small and well separated, arranged more or less regularly in fifteen columns, one to three to a column. Fifteen to forty-five cirri with eight to fifteen joints; first joint short, second longer than broad, usually considerably elongated, the following joints gradually decreasing in length distally; all the joints have enlarged and flaring distal ends; there are no dorsal spines, but the opposing spine is always well developed, triangular, its distal edge vertical, its proximal edge straight, running from the anterior end of the penultimate joint to the tip of the spine. Radials always visible, usually for a large part of their length, strongly concave on their anterior border, strongly produced in the interradial angles where they partially or entirely separate the first costals; costals and lower brachials in close apposition laterally, and more or less flattened; the costals and the joints of the ten arms are all rather long, the latter with a concave surface, making the ends prominent. The lower pinnules appear to be slender, with the first shorter than the second.

*Color*.—Light grayish brown.

*Geographic distribution*.—Bering Sea southward to the Antarctic Ocean, north in the Atlantic to the Abrolhos Islands, off the coast of Brazil.

*Depth*.—818 to 2,900 fathoms.

The elongation of the second cirrus joint and the interradial processes of the radials distinguish this genus at once from all others. The included species are,

*B. abyssicola* (P. H. Carpenter).

*B. carpenteri* A. H. Clark.

*B. brevicirca* A. H. Clark.

*B. minutissima* A. H. Clark.



**Hypalometra** gen. nov.

*Genotype*.—*Antedon defecta* P. H. Carpenter, 1888.

Radial faces longer than broad, the muscular fossæ large, the notch between them broad, but very shallow. Centro-dorsal hemispherical, or more or less sub-conical, thickly covered with cirri, a small polar area bare. Cirri twenty to thirty, with twenty to twenty-five joints, one or two of the basal about three times as long as wide, thence decreasing distally, the joints in the terminal half being squarish; no dorsal spines; opposing spine well developed. Radials visible, not extending much beyond the edge of the centro-dorsal; costals moderately long, well rounded, and widely separated laterally. Ten arms of rather long joints. First exterior and first interior pinnule absent; the lowest pinnule is that of the fifth brachial, which is borne on the outside of the arm; it is composed of (except the basal) elongate joints, and bears a genital gland; the following pinnules decrease in length, then increase again distally.

*Color* (in spirits).—White, the arms sometimes crossed with narrow transverse brown bands.

*Geographic distribution*.—Caribbean Sea, north to Florida.

*Depth*.—77 to 242 fathoms (Carpenter).

The hemispherical centro-dorsal bearing numerous cirri which have a moderate number of joints, elongate proximally, squarish distally, combined with the entire absence of oral pinnules (the lowest pinnule bearing a genital gland) distinguish this genus at once from all others. The only known species is the common

*Hypalometra defecta* (P. H. Carpenter).

**Isometra** gen. nov.

*Genotype*.—*Antedon lineata* P. H. Carpenter, 1888.

Centro-dorsal hemispherical or sub-conical, almost completely covered with cirrus sockets. Cirri about twenty-five in number with about thirty joints, subequal, approximately squarish, overlapping dorsally, the distal sometimes with more or less developed spines. Radials about even with the edge of the centro-dorsal; first costals oblong, about twice as broad as long; costal axillaries pentagonal, wider than long; the costals are rounded and entirely separated from each other. Ten smooth arms; brachials at first oblong or slightly wedge-shaped, broader than long, then becoming more obliquely wedge-shaped and as long as, or longer than, wide, becoming elongate distally. First two or three pinnules slender, "styiform," with elongate joints; following (genital) pinnules with the third and fourth joints expanded and broadly V-shaped.

*Geographic distribution*.—Only known from the south Atlantic, off Uruguay.

*Depth*.—600 fathoms.

This genus is readily distinguishable from all the other genera of Antedonidae by the expanded joints of the genital pinnules. The only known species is,

*Isometra angustipinna* (P. H. Carpenter).

*Isometra angustipinna* is without doubt the young of *Antedon lineata* P. H. Carpenter, 1888 (not *Antedon lineatus* Pomel, 1887), which was renamed *challengeri* by A. H. Clark in 1907, before its relation to *angustipinna* was detected.

#### FAMILY PENTAMETROCRINIDÆ nom. nov.

##### **Pentametrocrinus** gen. nov.

*Eudiocrinus* P. H. Carpenter, 1882 (part), but not *Ophiocrinus* Semper, 1868 (not *Ophiocrinus* Salter, 1856).

*Genotype*.—*Eudiocrinus japonicus* P. H. Carpenter, 1882.

Costals absent, the first post-radial joint being the first brachial; no orals; five arms.

*Color*.—Purplish gray, the disk black.

*Geographic distribution*.—Intertropical; West Indies; coasts of southern Europe; coast of Somaliland eastward through the Indian Ocean to southern Australia, northward to Japan.

*Depth*.—103 to 1,050 fathoms; mainly abyssal.

*Eudiocrinus* was originally differentiated from "*Antedon*" on account of the possession of five undivided arms; and it seems to have escaped the notice of all subsequent workers on the comatulids that the undivided arms of the *Eudiocrinus indivisus* type are radically different in structure from those of the *Eudiocrinus japonicus* type. *Eudiocrinus indivisus*, *E. granulatus*, and *E. variegatus* (the first the type of the genus) have two costals united by syzygy, as in *Zygometra*, the genus to which they show the closest affinity; but they differ from *Zygometra* in that the second costal bears a pinnule instead of an additional arm. The third post-radial joint is the real first brachial, and is joined to the succeeding joint by synarthry, as the first brachial is joined to the second in all comatulids; there is, of course, no pinnule on this joint, as the first brachial never bears a pinnule; the fourth post-radial joint (*i. e.*, second brachial) is joined to the succeeding by an "oblique muscular" articulation, as are all second brachials to succeeding joints; it bears a pinnule on the side opposite to that on which the costal pinnule is borne, as a synarthrial articulation, like its derivative, a syzygy, not only never admits of the development of a pinnule, but is non-effective in regard to the pinnule developed on the next oblique muscular articulation, which, therefore, occurs on the same side as it would if the synarthry or syzygy were not there, but the two joints were merely a single joint. A muscular articulation, on the other hand, always affects the position of the next pinnule, no matter whether a pinnule is developed at the articulation or not, causing it to appear on the same side as the preceding pinnule; *Perometra* and *Cyllo-metra* and also *Erythrometra* are examples of this. Between the fifth and sixth post-radial joints (*i. e.*, the third and fourth brachials) occurs the first syzygy, which, therefore, occupies the same position as in *Zygometra* and in almost all other comatulids. In "*Eudiocrinus*" *atlanticus*, *E. japonicus*, *E. semperi*, *E. tuberculatus*, and *E. varians*, as in *Decametro-*

*crinus* and *Thaumatocrinus*, the costals\* are absent, and the first post-radial joint is the first brachial. As an item of considerable interest it may be mentioned that in these species of "*Eudiocrinus*," in *Decametrocrinus*, *Thaumatocrinus*, and *Uintacrinus*, the first syzygy is between the fourth and fifth brachials, not between the third and fourth as is commonly the case; in analyzing the arms of *Uintacrinus*, it must be remembered that there are two distichals present, of which the second is not an axillary, so that the first brachial is the third joint from the costal axillary.

The genus *Pentametrocrinus*, as here defined, contains the following species:

<i>P. atlanticus</i> (Perrier).	<i>P. semperi</i> (P. H. Carpenter).
<i>P. japonicus</i> (P. H. Carpenter).	<i>P. tuberculatus</i> (A. H. Clark).
<i>P. varians</i> (P. H. Carpenter).	

Some time ago I proposed the family Eudiocrinidae to cover these species and *Decametrocrinus*, not being aware at the time that *Eudiocrinus indivisus* was so radically different. *Eudiocrinus* as here restricted belongs to the family Zygometridae with the genus *Zygometra*, while *Pentametrocrinus* and *Decametrocrinus* may be united under the family name of **Pentametrocrinidae**, which is the exact equivalent to what I intended by my "Eudiocrinidae." Minckert's family "Decametrocrinidae" must be rejected, it being composed of *Promachocrinus*, a genus of Antedonidae very near *Heliometra*, and the utterly different *Decametrocrinus*.

The arm structure of *Thaumatocrinus* suggests that in reality it belongs to the Pentametrocrinidae, near *Pentametrocrinus*.

The genera of free crinoids belonging to the Comatulida may be grouped as follows, the most specialized types being placed first.

#### FAMILY UINTACRINIDÆ.

##### *Uintacrinus*.

#### FAMILY COMASTERIDÆ.

##### *Comatula*.

##### *Comaster*.

#### FAMILY ZYGOMETRIDÆ.

##### *Eudiocrinus*.

##### *Zygometra*.

#### FAMILY HIMEROMETRIDÆ.

##### *Himerometra*.

##### *Cyllometra*.

##### *Poutiometra*.

##### *Oligometra*.

#### FAMILY TROPIOMETRIDÆ.

##### *Tropiometra*.

##### *Calometra*.

##### *Asterometra*.

##### *Ptilometra*.

\* The costals are, in reality, merely repetitions of the two first brachials of the free arm interpolated between the regular first brachials and the radials; the distichals and palmars are additional reduplications of the two first brachials, either single (2) or double (4[3 + 4] or 4[1 + 2; 3 + 4]), the two pairs in this latter case being separated by a muscular articulation like that at the distal end of all costal and division series.

## FAMILY THALASSOMETRIDÆ.

<i>Pacilometra.</i>	<i>Thalassometra.</i>
<i>Charitometra.</i>	

## FAMILY ANTEDONIDÆ (restricted).

<i>Perometra.</i>	<i>Leptometra.</i>
<i>Erythrometra.</i>	<i>Hathrometra.</i>
<i>Zenometra.</i>	<i>Iridometra.</i>
<i>Psathyrometra.</i>	<i>Trichometra.</i>
<i>Adelometra.</i>	<i>Bathymetra.</i>
<i>Heliometra.</i>	<i>Nanometra.</i>
<i>Promachocrinus.</i>	<i>Compsometra.</i>
<i>Thaumatometra.</i>	<i>Hypalometra.</i>
<i>Thysanometra.</i>	<i>Isometra.</i>
<i>Coccoometra.</i>	<i>Antedon.</i>

## FAMILY PENTAMETROCRINIDÆ.

<i>Decametrocrinus.</i>	<i>Pentametrocrinus.</i>
<i>Thaumatocrinus.</i>	